10

(57) [Abstract]

[Object] To enable an MIB containing a part of the
management information virtually to be managed from other
NMS.

15   [Constitution] A service MIB generating/annihilating
portion 12 generates a service MIB 13-1 upon a partial
management start request from other NMS 2-1. A service MIB
access portion 16 makes an MIB access request to a system
MIB access portion 16 by referring to the service MIB 13-1
20   and making mapping with a system MIB 17. An update
notification portion 15 makes an update notification to a
self NMS integrated manager 18 and other NMS 2-2, when
updating the service MIB 13-1, and makes an update
notification to other NMS 2-2 when updating the system MIB
25   17.

[Advantages] There is no need for gaining access to an
enormous amount of management information at a referenced

system. The inclusion relation or identifier may be

changed artificially to make the management.

[Claims for the Patent]

[Claim 1]

A network management system comprising a service MIB generating/annihilating portion for generating a service MIB for other NMS (Network Management System) by referring to the service MIB (Management Information Base) generating information of said other NMS and a system MIB upon accepting a partial management start request from said other NMS that is other network management system, or annihilating the service MIB for said other NMS upon accepting a partial management end request from said other NMS.

[Claim 2]

A network management system comprising a service MIB access portion for making an MIB access request to a system MIB access portion by referring to a service MIB for other NMS and making mapping with a system MIB upon an MIB access request from said other NMS.

[Claim 3]

A network management system comprising an event distributing portion for distributing an MIB access request to a service MIB access portion or a system MIB access portion in accordance with an originator upon receiving an MIB access request from other NMS or self NMS integrated manager.

[Claim 4]

A network management system comprising:

a system MIB access portion for updating a system MIB
and making an update notification request to an update
notification portion upon an MIB access request from a
service MIB access portion or an event distributing

5   portion; and

said update notification portion for determining the
necessity of update notification to self NMS integrated
manager and other NMSs and making an update notification
to said self NMS integrated manager and said other NMSs upon

10 an update notification request from said system MIB access
portion.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

15   The present invention relates to a network management
system for managing a network.

[0002]

[Prior Art]

In the conventional network management system (NMS),

20 when other NMS refers to the management information managed
by self NMS, self NMS becomes an agent of other NMS, and
other NMS directly refers to the entire management
information managed by self NMS as the retrieval object.

[0003]

25 [Problems to be Solved by the Invention]

In the case where the user employs a part of a large
network such as VAN, there is the possibility that the user

already has a network of one's own apart from the VAN, and operate the own NMS. In such case, it is conceived that a part of the network resources for a certain NMS may be managed from other NMS, such that the NMS of the user refers to a part of the management information for the VAN. In the present situation, however, in the conventional network management system, when the information is exchanged between the NMSs, it is required to place the NMSs in a relation of a manager and an agent, whereby there is a drawback that the partial information can not be exchanged between the NMSs at equivalent standpoints.

[0004]

Accordingly, when a part of the network resources for a certain NMS is managed from other NMS, it is required to construct a relation of the manager and the agent between the NMSs, and integrate them as one NMS. Namely, it is not possible for an upper-level integrated manager to integrally manage a large network by not making each NMS a complete agent for the integrated manager, but strictly positioning the NMS as the manager to manage each area. Thereby, there are the following disadvantages.

[0005]

In the case where the referenced side is a large network, the referencing side is required to deal with an enormous amount of management information, and may accept an unnecessary amount of information, in addition to necessary

information as the retrieval result depending on the reference conditions.

[0006]

A new integrated manager must refer to the existing NMS as the agent. In the case where the structure of management information is greatly different depending on the NMS, it is required to coordinate the structure of management information on the referencing side and the referenced side. Therefore, the integrated manager has an increased load of management AP when the integrated manager absorbs its difference.

[0007]

It is conceived in some cases that all the management businesses already operated on each integrated manager are transferred to a new integrated manager. With the conventional method, it is difficult to integrate the existing NMSs while the existing manager continues to operate a part of the management businesses conducted on the existing NMSs.

[0008]

[Means for Solving the Problems]

A first invention provides a network management system comprising a service MIB generating/annihilating portion for generating a service MIB for other NMS (Network Management System) by referring to the service MIB (Management Information Base) generating information of the other NMS and a system MIB upon accepting a partial

management start request from the other NMS that is other
network management system, or annihilating the service MIB
for the other NMS upon accepting a partial management end
request from the other NMS.

5 [0009]

Also, a second invention provides a network management
system comprising a service MIB access portion for making
an MIB access request to a system MIB access portion by
referring to a service MIB for other NMS and making mapping
10 with a system MIB upon an MIB access request from the other
NMS.

[0010]

Also, a third invention provides a network management
system comprising an event distributing portion for
15 distributing an MIB access request to a service MIB access
portion or a system MIB access portion in accordance with
an originator upon receiving an MIB access request from
other NMS or self NMS integrated manager.

[0011]

20 Moreover, a fourth invention provide a network
management system comprising   a system MIB access
portion for updating a system MIB and making an update
notification request to an update notification portion upon
an MIB access request from a service MIB access portion or
25 an event distributing portion, and the update notification
portion for determining the necessity of update
notification to self NMS integrated manager and other NMSs

and making an update notification to the self NMS integrated manager and the other NMSs upon an update notification request from the system MIB access portion.

[0012]

5   [Embodiments]

The preferred embodiments of the present invention will be described below with reference to the accompanying drawings.   Figure 1 is a block diagram showing an embodiment of a network management system of the invention.   The

10   network management system of the invention consists of a self NMS 1 connected to other NMSs 2-1 and 2-2, and within the self NMS 1, an event distributing portion 11, a service MIB generating/annihilating portion 12, the service MIBs 13-1 and 13-2, a service MIB access portion 14, an update

15   notification portion 15, a system MIB access portion 16, a system MIB 17, a self NMS integrated manager 18, and the service MIB generation information 19-1 and 19-2, as shown in Figure 1.

[0013]

20   Note that the MIB (Management Information Base) is a function for holding the information of managed object. Also, other NMS 2-1, 2-2 is the user who uses the functions provided by the self NMS 1, and there is no limitation in the number of users.

25   [0014]

The event distributing portion 11 distributes an event to the internal processes in accordance with its originator

and the contents, upon receiving an event from other NMS 2-1, 2-2 and the self NMS integrated manager 18. The service MIB generating/annihilating portion 12 generates the service MIB 13-1, 13-2 by referring to the service MIB

5 generation information 19-1, 19-2 and the system MIB 17 in accordance with a service MIB generating instruction from other NMS 2-1, 2-2.

[0015]

Note that the service MIB generation information 19-1

10 is the information for generating the service MIB 13-1 referred to by other NMS 2-1, and the service MIB generation information 19-2 is the information for generating the service MIB 13-2 referred to by other NMS 2-2. The service MIB generation information 19-1, 19-2 is defined as the SG

15 information corresponding to other NMS 2-1, 2-2 at the time of system generation, or notified as the miscellaneous information associated with the partial management start request from other NMS 2-1, 2-2.

[0016]

20 Also, the system MIB 17 holds the management information of self network as a whole. The service MIB 13-1 is referred to and updated by the service MIB access portion 14 and the update notification portion 15. The service MIB 13-1 is an excerpt or artificial alteration of

25 a part of the management information from the system MIB 17. And the service MIB access portion 14 makes an MIB access request to the system MIB access portion 16 by

referring to the service MIB 13-1 and mapping with the system MIB 17 upon an MIB access request from other NMS 2-1.

[0017]

On the other hand, the update notification portion 15 makes an update notification to other NMS 2-2 upon an update request from the system MIB access portion 16. Also, the system MIB access portion 16 refers to or updates the system MIB 17 and makes an update notification to the update notification portion 5 upon an MIB access request from the service MIB access portion 14 or the event distributing portion 11.

[0018]

The self NMS 1 manages the self network, and the self NMS integrated manager 18 integrally manages the self network. Also, other NMS 2-1 manages other network, and is the user of the service MIB 13-1. Other NMS 2-2 manages other network, and is the user of the service MIB 13-2.

[0019]

The operation of the invention will be described below. First of all, the event distributing portion 11 delivers an event to the service MIB generating/annihilating portion 12, if the accepted event is a partial management start request or a partial management end request, delivers an event to the service MIB access portion 14 when the originator is other NMS 2-1, 2-2 when viewing it, or delivers an event to the service MIB access portion 16, when

the originator is the self MNS integrated manager 18, if
the accepted event is an MIB access request.

[0020]

Also, the service MIB generating/annihilating portion
12 generates a service MIB 13-1 by referring to the service
MIB generation information 19-1 that is present in
correspondence to the user, upon accepting a partial
management start request from other NMS 2-1. Other NMS 2-1
makes aware of the service MIB 13-1 alone, but is unaware
of the system MIB 17. It annihilates the service MIB 13-1
corresponding to other NMS 2-1 upon accepting a partial
management end request from other NMS 2-1.

[0021]

Figure 2 is a view showing an inclusive tree in this
embodiment. A service MIB generating method will be
described below. The self network makes aware of an
inclusive tree 21 of system MIB, generating an inclusive
tree 23 of service MIB to appear artificially an inclusive
tree 22 that other NMS makes aware of, as shown in Figure
2.

[0022]

Figure 3 is a diagram showing an artificial change in
an inclusive tree structure in this embodiment.
Specifically, other NMS 2-1 extracts some managed objects
from the system MIB 31, creates an MIB 32 after extraction,
reconfigures the MIB to facilitate the management of other
NMS 2-1, creates an MIB 33 after reconfiguration, changes

the identifier to facilitate the management of other NMS 2-1, and creates a service MIB 34, as shown in Figure 3.

[0023]

Figure 4 is a diagram showing a correspondence between the inclusive tree and the instance information in this embodiment. In Figure 4, reference signs A to H denote a relative identifier of each node. The service MIB 13-1 consists of an inclusive tree 42 of service MIB and the mapping information to the instance information 43 of system MIB, and does not have the instance information peculiar to the service MIB.

[0024]

More specifically, the required managed objects are extracted from the inclusive tree 41 of service MIB and the instance information 43 of system MIB, the inclusive relation is changed, the relative identifier (A to H in Figure 4) and the attribute value (data within the instance information) are changed and presented to other NMS 2-1 and 2-2 as the virtual agent.

[0025]

Figure 5 is a diagram showing a mapping between the inclusive tree of service MIB and the inclusive tree of system MIB in this embodiment. As shown in Figure 5, the node tables 51 to 63 are created corresponding to the nodes. And the relative identifier is a name of managed object that is attached to each node of the inclusive tree, and unique

under the same node. The node ID is an identifier attached uniquely in the entire system to each node.

[0026]

The next relative identifier is the relative identifier of the node directly under the self node in the inclusive tree. The next node ID is the node ID directly under the self node in the inclusive tree. An upper level node table and a lower level node table are chained by the node ID. A node table of service MIB and a node table of system MIB employ the same node ID, whereby even if the relative identifier or inclusive relation is changed, the mapping between the service MIB and the system MIB can be made using the node ID.

[0027]

Thus, the service MIB access portion 14 makes an MIB access request to the system MIB access portion 16 by referring to the service MIB 13-1 and making mapping with the system MIB 17 upon accepting the MIB access request from other NMS 2-1.

[0028]

Also, the system MIB access portion 16 refers to or updates the system MIB 17 upon the MIB access request from the service MIB access portion 14 or the event distributing portion 11, and makes an update notification to the update notification portion 15, if the system MIB 17 is updated.

[0029]

And the update notification portion 15 refers to the service MIB 13-2, if the update notification from the system MIB access portion 16 is the result of MIB access request from other NMS 2-1, and makes the update notification to other NMS 2-2, and to the self NMS integrated manager 18 in accordance with a specification of notification required in the system MIB 17, if the updated object is the managed object of other NMS 2-2 and the update notification required is specified in the service MIB 13-2.

[0030]

Also, the update notification portion 15 refers to the services MIB 13-1 and 13-2, if the update notification from the service MIB access portion 14 is the result of MIB access request from the self NMS integrated manager 18, makes the notification to other NMS 2-1, if the updated object is the managed object of other NMS 2-1, or makes the notification to other NMS 2-2, if the updated object is the managed object of other NMS 2-2. In this case, if the notification unrequired is specified in the service MIB 13-1, 13-2, the update notification may not be made. The update notification herein is made in terms of M-EVENT-REPORT notification.

[0031]

[Advantages of the Invention]

As above described, the network management system of the invention has the effect that it allows the NMS in other network to manage a part of an enormous amount of

information. That is, to extract the information of resources related to other network from the system MIB, and provide a compact agent, the NMS in other network does not need to make aware of the enormous amount of complex management information over the entire self network. Accordingly, it is possible to provide an application in which the NMS of the VAN user refers to a part of the management information for the VAN.

[0032]

Also, the network management system of this invention has the effect that when the management AP on the NMS in other network makes aware of an inclusive tree structure that is different from the actual inclusive tree structure of the self network, the management information (inclusive relation or identifier) is changed artificially to be beneficial for the management AP on the NMS in the other network, employing the service MIB function, so that the management AP is less changed.

[0033]

Moreover, the network management system of this invention has the effect that when the existing NMS is present, and the management businesses are already operated on individual integrated managers, a part of the management businesses performed on the existing NMS can continue to be operated on the respective existing manager, without integrating all the management businesses. Namely, each agent is not a complete agent of the integrated manager,

but the upper-level manager can make the integral
management over the large network, while each agent manages
each area as the manager.

[0034]

5   Moreover, the network management system of the
invention has the effect that even when the integrated
manager of the self NMS and the NMS manage the same managed
object in parallel, it is possible to update the management
information for the managed object within the MIB, because
10   the event distributing portion distributes an event by
determining the originator, the NMS does not need to make
aware of whether the access object is system MIB or service
MIB, and the update notification portion determines the
necessity of update notification to the integrated manager
15   of the self NMS and the other NMS to make the update
notification.

[Brief Description of the Drawings]

[Figure 1]

        Figure 1 is a block diagram showing an embodiment of
20   a network management system of the present invention.

[Figure 2]

        Figure 2 is an inclusive tree in this embodiment.

[Figure 3]

        Figure 3 is a diagram showing an artificial change in
25   an inclusive tree structure in this embodiment.

[Figure 4]

Figure 4 is a diagram showing a correspondence between the inclusive tree and the instance information in this embodiment.

[Figure 5]

Figure 5 is a diagram showing a mapping between the inclusive tree of service MIB and the inclusive tree of system MIB in this embodiment.

[Reference Numerals and Signs]

1   self NMS

2-1, 2-2   other NMS

11   event distributing portion

12   service MIB generating/annihilating portion

13-1, 13-2   service MIB

14   service MIB access portion

15   update notification portion

16   system MIB access portion

17   system MIB

18   self NMS integrated manager

19-1, 19-2   service MIB generation information

【図1】

Figure 1

1   Self NMS

2-1   Other NMS

2-2   Other NMS

11   Event distributing portion

12   Service MIB generating/annihilating portion

13-1 Service MIB

13-2 Service MIB

14   Service MIB access portion

15   Update notification portion

16   System MIB access portion

17   System MIB

18   Self NMS integrated manager
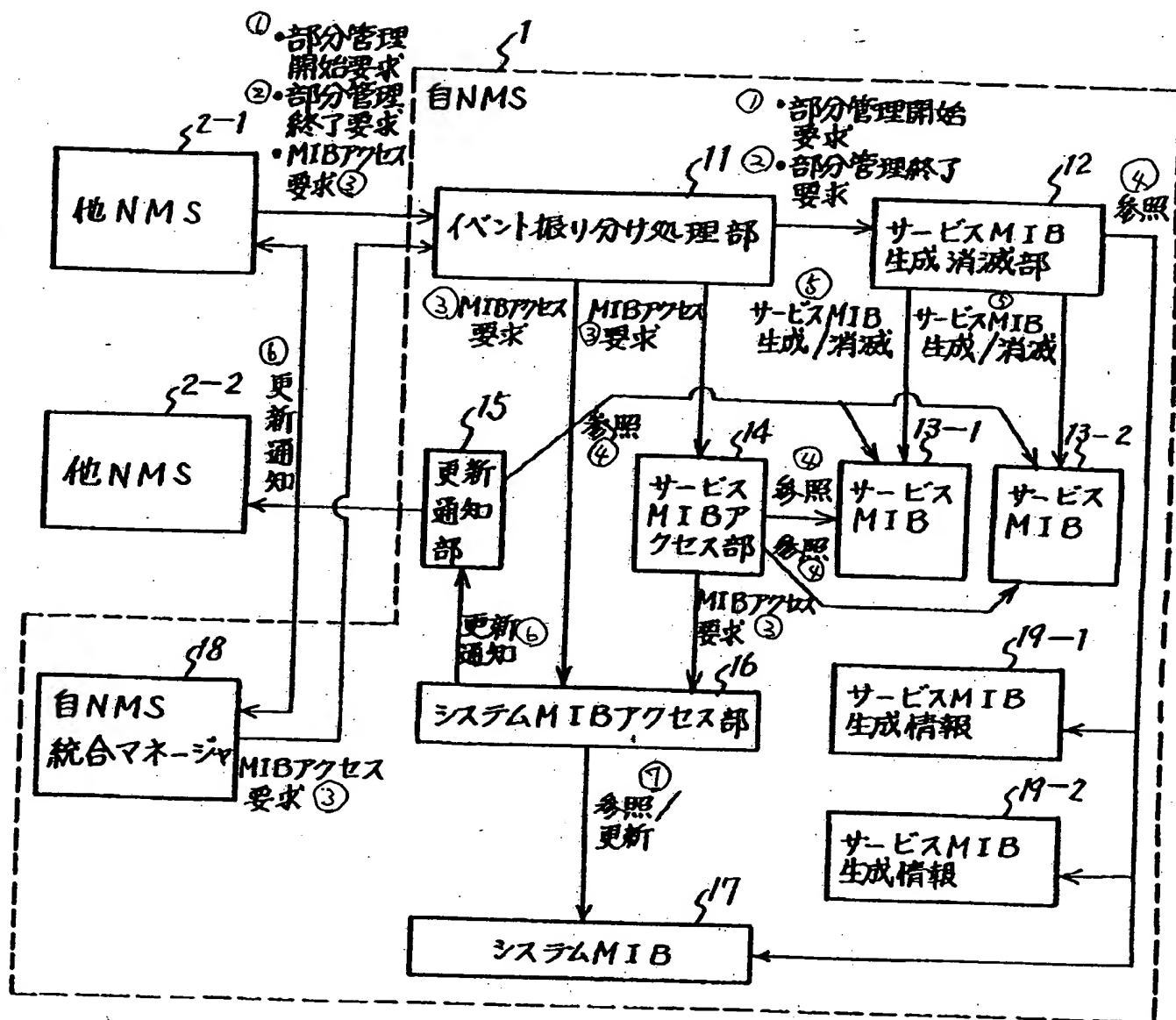
19-1, 19-2   Service MIB generation information

① Partial management start request

② Partial management end request

③ MIB access request

④ Reference

⑤ Service MIB generation/annihilation

⑥ Update notification

⑦ Reference/update

FIG.2.　【図2】

システムMIBの包含木―INCLUSIVE TREE OF SYSTEM MIB

Root ── PBX ── PBX(C) ── ユニット(H) UNIT
　　　ネットワーク(A)　　　　　　　ボタン電話機(G)
　　　NETWORK ── ミニPBX(D)―MINI PBX ── BUTTON TELEPHONE
PERSONAL
COMPUTER ── パソコン ── パソコン(E)― PERSONAL COMPUTER
NETWORK ── ネットワーク(B) ── FAX(F)

21

他NMSが意識する包含木―INCLUSIVE TREE SENSED BY OTHER NMS

Root ── PBX ── 電話機 ―TELEPHONE
　　　── パソコン ── FAX
　　　　PERSONAL COMPUTER

22

サービスMIBの包含木 ―INCLUSIVE TREE OF SERVICE MIP

Root ── PBX(C) ── 電話機(P) TELEPHONE
　　　── パソコン(E) ― FAX(F)
　　　　PERSONAL COMPUTER

23

Figure 4

【図4】

41　Inclusive tree of system MIB

42　Inclusive tree of service MIB

43　Instance information of system MIB

#1　MO: Instance information of managed object
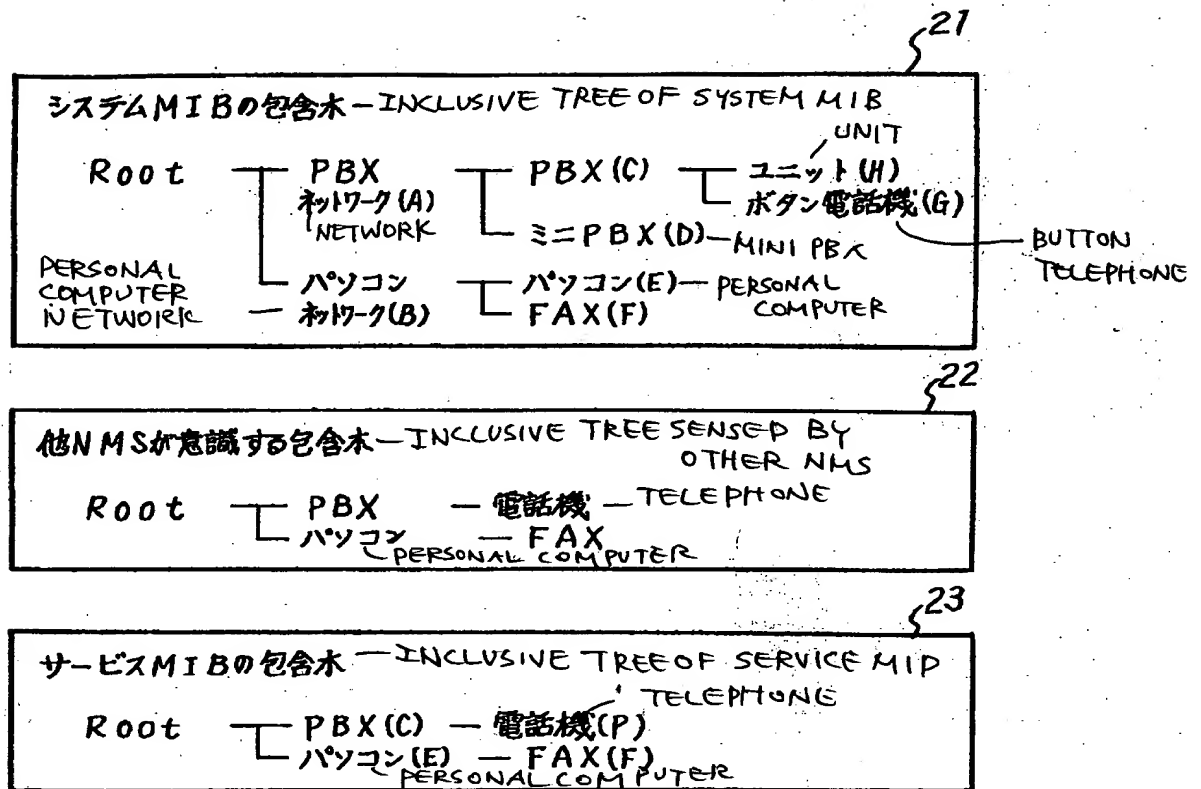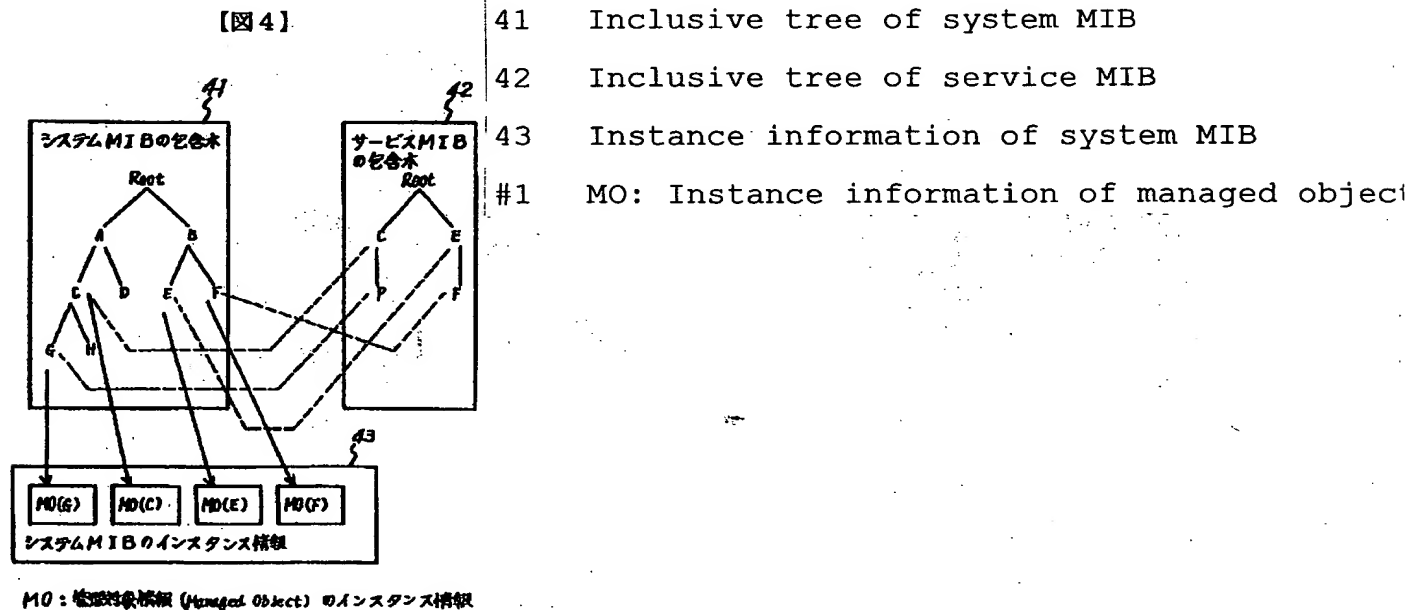

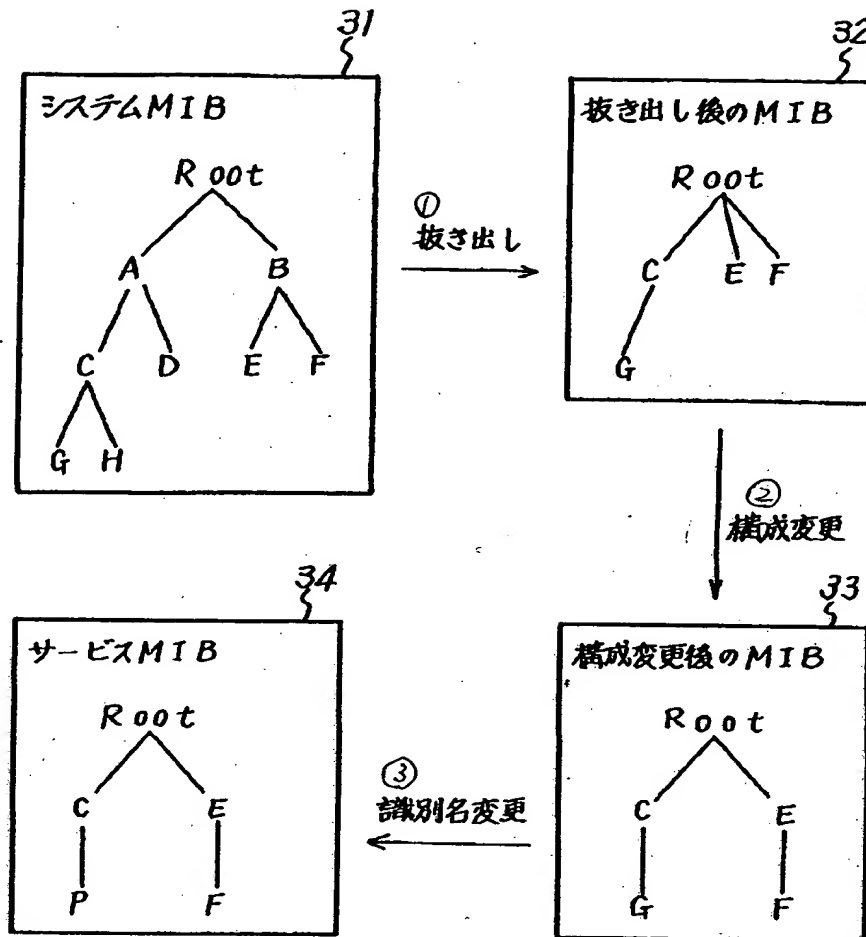MO：管理対象情報 (Managed Object) のインスタンス情報

【図3】

Figure 3

31　　System MIB

　　　　Extraction

32　　MIB after extraction

33　　MIB after configuration change

34　　Service MIB

①　　Extraction

②　　Change of configuration

③　　Change of identifier

FIG.5

【図5】

#1 ＜システムMIBの包含木＞

#2 ＜サービスMIBの包含木＞

NODEID:0 — ノードID:0　51

① 相対識別名	ROOT
② ノードID	0
③ 次相対識別名	a
④ 次ノードID	1
③ 次相対識別名	b
④ 次ノードID	2

NODEID:1 — ノードID:1　52

① 相対識別名	a
② ノードID	1
③ 次相対識別名	c
④ 次ノードID	3
③ 次相対識別名	d
④ 次ノードID	4

NODEID:2 — ノードID:2　53

① 相対識別名	b
② ノードID	2
③ 次相対識別名	e
④ 次ノードID	5
③ 次相対識別名	f
④ 次ノードID	6

NODEID:3 — ノードID:3　54

① 相対識別名	c
② ノードID	3
③ 次相対識別名	g
④ 次ノードID	7
③ 次相対識別名	h
④ 次ノードID	8

NODEID:5 — ノードID:5　55

① 相対識別名	e
② ノードID	5
③ 次相対識別名	null
④ 次ノードID	null

NODEID:6 — ノードID:6　56

① 相対識別名	f
② ノードID	6
③ 次相対識別名	null
④ 次ノードID	null

NODEID:7 — ノードID:7　57

① 相対識別名	g
② ノードID	7
③ 次相対識別名	null
④ 次ノードID	null

NODEID:8 — ノードID:8　58

① 相対識別名	h
② ノードID	8
③ 次相対識別名	null
④ 次ノードID	null

ノードID:0 — NODEID:0　59

① 相対識別名	ROOT
② ノードID	0
③ 次相対識別名	c
④ 次ノードID	3
③ 次相対識別名	e
④ 次ノードID	5

ノードID:3 — NODEID:3　60

① 相対識別名	c
② ノードID	3
③ 次相対識別名	P
④ 次ノードID	7

ノードID:5 — NODEID:5　61

① 相対識別名	e
② ノードID	5
③ 次相対識別名	f
④ 次ノードID	6

ノードID:6 — NODEID:6　62

① 相対識別名	f
② ノードID	6
③ 次相対識別名	null
④ 次ノードID	null

ノードID:7 — NODEID:7　63

① 相対識別名	P
② ノードID	7
③ 次相対識別名	null
④ 次ノードID	null

#1 ＜Inclusive tree of system MIB＞

#2 ＜Inclusive tree of service MIB＞

① Relative identifier

② Node ID

③ Next relative identifier

④ Next node ID